Notes on Richardia Africana.

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Of the many abnormal "flowers" of Richardia Africana which have come under the writer's observation the most interesting departure from normal structure yet seen made its appearance a short time since in one of the green-houses among a lot of several hundred "callas."

In this monster the spathe and spadix while developing in the manner of an ordinary inflorescence were found at maturity to be independent, or disunited, and each on a stalk of its own.

The spathe was somewhat larger than usual, more spreading, and not at all convolute at the throat. Its stock or petiole was sheath-like from the spathe down to the base and clasped the scape which supported the bractless spadix almost in the same manner that the petiole clasps an ordinary "flower" stalk.

The white color and texture of the spathe extended for some distance down the free wavy margins of the petiole.

The spadix was normal otherwise except in having fewer ovaries than usual. At first it occupied the ordinary position in the spathe; but after a few days, owing to continued growth of its scape, it became elevated 4^{cm} above its usual position.

There was a coadnation at the base of the scape and petiole for 9^{cm} upward, but this involved only the posterior wall of the sheath while the anterior edges were free.

This self-analyzed inflorescence makes clear the morphological structure of the Richardia flower and peduncle. One writer has explained the scape as made up of "several leaf-stalks grown together in a bundle," but it now is evident that only one leaf is involved. The spadix is at the summit of a single much elongated internode of rhizome, to which in the normal inflorescence the sheathing leaf-stalk is adnate.

In the spadix itself there is complete suppression of bractlets to which the flowers are, however, theoretically axillary. Even keeping this in view it is not necessary to regard the scape as involving a number of leaf-stalks in its structure since if bractlets existed they would more likely be stalkless appendages rather than the free tips at the summits of long theoretical petioles.

This "flower" had a good opportunity to fertilize itself if this had been possible. In the hope of getting it to seed the stigmas were hand pollinated after about the third day. But in vain. After about three weeks the ovaries had developed considerably and attained about half size. Then they stopped growing and the spadix began to shrivel. The spathe withered earlier.

This result and experiments with several other plants convinced the writer that the flowers are proterogynous. Examination showed that the stigmas were receptive of pollen about three days before the pollen of the same spadix begins to fall, and when the pollen appears the stigmas are much shrunken.

Four flowering plants were set aside, and with due precautions, left to fertilize themselves. Although the ovaries began development they withered when about half grown. The "calla" is said rarely to produce seed in the green house. We now have in its proterogyny, the explanation.

The spathe is a specialization looking to cross fertilization, although its convolute and funnel-like base at first might seem nicely adapted for catching the pollen and bringing about self fertilization. It is likely this occurs, however, in Araceæ just in proportion as the spathe is reduced and the individual flowers on the spadix become hermaphrodite and complete.

In the Richardia there are on most of the older and larger leaves two gland-like bodies at the summit of the petiole where the basal lobes of the lamina join the leaf stalk. They look as if they might be nectar glands; but they are probably merely thickenings to strengthen the blade against tearing, when the plants are growing in running water, and occasionally submerged, as is the case in their native land.

While engaged in these observations it occurred to me to investigate the manner in which the pollen is forced out through the minute pores.

The anthers are almost sessile somewhat cuboidal bodies. Wood's "Class book" gives them as two-celled, but the cells being bilocellate they may be called four-celled. The locelli are vertical, oblong, thin-walled, and confluent above into a single tube, terminating in a minute pore through which the pollen is pressed.

The discharge of the pollen was found to be brought about by pressure caused by the gradual enlargement of the connec-

tive. In a young anther the connective is delicate and thin, making up about one-third the width of the anther. In old anthers it composes about two-thirds of the width, having become broad and plump as the cells decreased in size from the loss of their contents. All this takes place without any appreciable change in the size of the anther as a whole. The connective thus acts like a wedge between the cells. The sessile anthers being much crowded, growth of the connective results in a mutual pressure between the cells of one anther, and those of its neighbor.

The grains of pollen are smooth walled and slippery with mucilage, so under the pressure readily escape through the small pore. While within the cell the grains are semi-translucent but on escaping they become opaque white. The mucilage moistening their surface causes the grains to adhere together as they escape. Consequently the pollen is found in filamentous form. This is evidently with reference to transportation by some kind of living agent.

It is noticed that the summit of the anther through which the discharge tube leads is transversely thickened and quite firm. This is for the purpose of preventing rupture of the pore, and securing the discharge of pollen in the form of a filament, instead of a mass as would be the case were it not for the precaution nature has taken.

On cutting off the summit of the anther the relief to pressure results in the immediate discharge of the pollen in the form of cylindrical masses as large as the diameter of the locelli. Thus it is seen the contents of the anther cells are subjected to a considerable pressure, as necessary to secure the discharge of the pollen in the form of filaments as seen in the normal anther.

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